Regional Assessment of Weather and Freight Impacts

DTFH61-12-D-00048-T-13005

FHWA Road Weather
Program Stakeholder Meeting

Salt Lake City, Utah

Presented by:

Cambridge Systematics

August 13, 2014

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Project Background

Background

- Commercial vehicles main mode of freight transportation
  - » $500 billion freight sector
  - » 70% of total value and 60% of weight moves by truck
  - » Estimates that adverse weather is responsible for 12% to 25% of all delay
  - » Trucking delays due to weather = $3.1 billion/yr for the 50 largest cities
  - » Lost commerce due to snow closures = $10 billion/day
- Other economic impacts of adverse weather
  - » More than $2 billion/yr is spent on snow and ice control by State DOTs
  - » Weather accounts for 25% of non-recurring congestion

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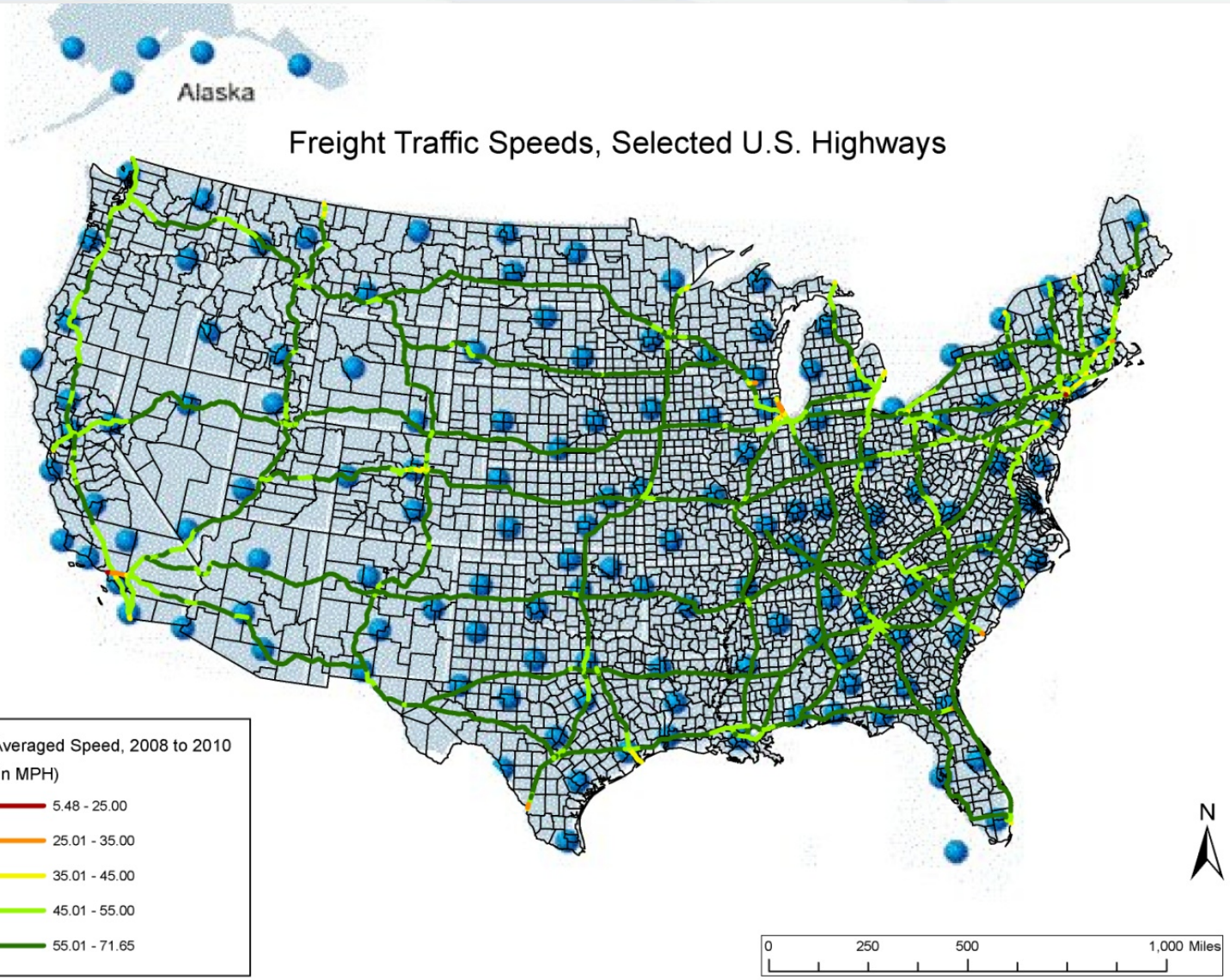
Project Background

- 1st Phase Study 2012
  - » National estimate of delay $8-$9 billion annually
  - » Developed model primarily on state-by-state basis
  - » Key data sources – used 3 year period 2008 to 2010
    - ATRI truck travel speed data (now in FHWA NPMRDS dataset)
    - NOAA weather data – Global Summary of the Day (GSOD)
    - Truck O-D data developed by project team from Global Insight Data
  - » Recommendations
    - Finer detail needed on truck movements and weather events
    - Conduct test scenarios in smaller areas/regions

Weather Data – GSOD



These stations were selected because they overlaid the truck speed data very well

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Second Phase

Key Analysis Questions

- How do different weather events impact truck travel speed and delay?
- What is the impact when different weather events combine?
- How do impacts vary between regions and roadways?

	Freeway Traffic Flow Reductions			
Weather Conditions	**Average Speed**	**Free-Flow Speed**	**Volume**	**Capacity**
Light Rain/Snow	**3%-13%**	**2%-13%**	**5%-10%**	**4%-11%**
Heavy Rain	**3%-16%**	**6%-17%**	**14%**	**10%-30%**
Heavy Snow	**5%-40%**	**5%-64%**	**30%-44%**	**12%-27%**
Low Visibility	**10%-12%**	**–**	**–**	**12%**

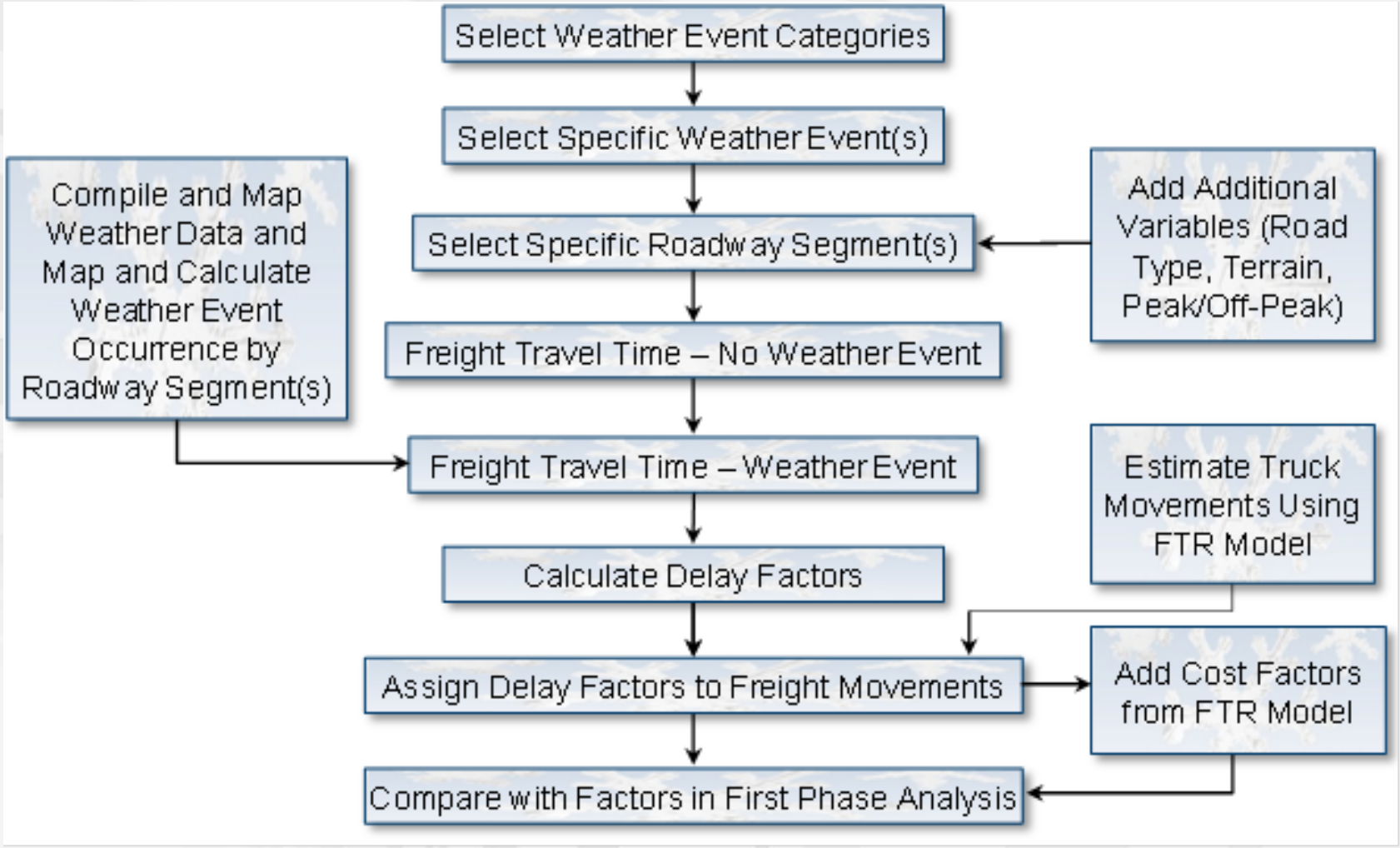
Scope of Work

- Areas of improvement to previous methodology
  - » Truck speed data on additional roads beyond NHS
  - » More detailed freight O/D and trip length data
  - » Distinguish between impacts of "regular" weather events and "major" events
  - » Comparison of truck speed data to other highway speed data (Advanced Traffic Management Systems)
  - » **Greater detail in weather data**
    - **Surface condition**
    - **Increased temporal detail (hourly at minimum)**
    - **Increased geographic detail (closer to truck routes)**

Scope of Work

- Selection of case study locations
  - » Key trucking corridors
  - » Major access route to ports or key industrial/warehouse areas
  - » Different types of terrain
  - » Variety of climatic conditions
  - » Vulnerability to major weather events
  - » Detailed reliable roadway performance data available
  - » Data available to advance knowledge of freight OD's, load content and supply chain
  - » Availability of detailed weather data

Scope of Work



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Scope of Work

» Sample of relationships to be derived from weather and roadway data

Percentage of Capacity In Use	<0.21	0.21-0.40	0.41-0.70	0.71-0.79	0.80-0.95	>0.95
Standard	100%	100%	100%	100%	100%	100%
Fog	73%	70%	67%	63%	60%	56%
High Wind	93%	92%	91%	89%	88%	87%
Very High Wind	87%	86%	85%	83%	82%	80%
High Wind and Light Snow	84%	81%	78%	76%	72%	69%
High Wind and Moderate Snow	75%	70%	65%	59%	53%	47%
Very High Wind and Moderate Snow	69%	64%	59%	53%	47%	40%

Scope of Work

- Key Issues
  - » Comparability of different regions
    - Driving habits
    - Different types of freight content and movement patterns
  - » Use of gridded weather data
    - Potentially provides more detail but processing can be resource intensive
    - Assess tradeoffs
  - » Adequate sample to isolate weather events (account for incidents, construction, etc.)

Schedule

Task Name and Deliverables	Due Dates
Task 1. Project Management	
1.1 – Kickoff Meeting	July 23
1.1.1 – Kickoff Meeting Presentation	July 21
1.2 – Draft PMP	July 17
1.3 – Final PMP	August 11
1.4 – Project Status Updates	Monthly
1.5 – Closeout Meeting	2 weeks prior to contract closeout
Task 2. Develop Proposed Approach and Methodology	
2.1 – Potential Data Sources and Resolutions Summary	November 7
2.2 – Potential Study Areas Summary	November 7
2.3 – Recommended Study Area and Data Source(s) Document (Technical Memo)	November 7
Task 3. Regional Scaling and Impacts	
3.1 – Impact Assessment Plan and Methodology – with Control Case	January 9
Task 4. Test and Verify Results and Develop Weather Delay Index	
4.1 – Detailed Report	May 1
Task 5. Assess Impacts at Varying Levels of the Supply Chain	
5.1 – Detailed Report of Freight Model Refinements and Varying Impacts of the Supply Chain	July 1
Task 6. State Congestions Modeling Analysis	
6.1 – Memo of Congestion Modeling Analysis	September 4
Task 7. Final Report	
7.1 – Draft Final Report	October 16
7.2 – Final Report	November 13
7.2 – Final Report 508	December 31

Help?

- Interested in having your area as a case study?
- Data on surface weather conditions?
  - » Variety of conditions?
  - » Precipitation type?
  - » Precipitation intensity?
  - » High temporal frequency?
- Weather data and traffic data integrated through ATMS?
- Major generator of truck traffic?

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Questions/Discussion